Positron emission tomography probe demonstrates a striking concentration of ribose salvage in the liver.

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Public Summary:
As stem cell-based therapies move into the clinic, there is a pressing need for new methods to monitor the activity of these therapies in patients. One area where this is particularly true is in the liver, a highly regenerative organ. In this paper, we develop a new clinically-relevant imaging technique that can be used to monitor the function of liver cells in mice and people. We carefully characterize this new technique and show that it can distinguish healthy from diseased liver in mice. We anticipate that this technique will become an important clinical tool and will enable physicians to better treat patients with stem cell-based therapies.

Scientific Abstract:
PET is a powerful technique for quantifying and visualizing biochemical pathways in vivo. Here, we develop and validate a novel PET probe, [(18)F]-2-deoxy-2-fluoroarabinose ([(18)F]DFA), for in vivo imaging of ribose salvage. DFA mimics ribose in vivo and accumulates in cells following phosphorylation by ribokinase and further metabolism by transketolase. We use [(18)F]DFA to show that ribose preferentially accumulates in the liver, suggesting a striking tissue specificity for ribose metabolism. We demonstrate that solute carrier family 2, member 2 (also known as GLUT2), a glucose transporter expressed in the liver, is one ribose transporter, but we do not know if others exist. [(18)F]DFA accumulation is attenuated in several mouse models of metabolic syndrome, suggesting an association between ribose salvage and glucose and lipid metabolism. These results describe a tool for studying ribose salvage and suggest that plasma ribose is preferentially metabolized in the liver.

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